



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
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Environmental Affairs Division

OFFICE OF  
PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Treatment of Seattle City Light Bunker C Fuel Oil by  
the Sunohio PCBX Process

FROM: Suzanne Rudzinski, Chief *Suzanne Rudzinski*  
Chemical Regulation Branch (TS-798)

TO: Anita Frankel, Chief  
Pesticides and Toxic Substances Branch  
Region X

Sunohio Company is one of the companies likely to process the 800,000 gallons of Bunker C fuel oil to be disposed of by the Seattle City Light Utility. The Seattle Fire Marshall expressed concerns over the processing of the oil by Sunohio. These concerns are:

1. The possibility of drops or slugs of water being inadvertently added to the process, generating hazardous quantities of hydrogen gas.
2. The complexity of the process equipment (continuous vs. batch).
3. The back feeding of the hydrogen gas into the process furnace.
4. Historical operational data indicated incidence of general accidents in or around the PCBX process trailers.

As a result, the Fire Marshall has imposed the following modifications and requirements:

Process Modifications

- A. Hydrogen Handling Modification: The present method to handle the hydrogen generated by the PCBX process is to separate the gas from the process stream and to burn it as an auxiliary fuel in the process heater furnace, located in the process trailer.

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- 1) The Fire Marshall is requiring Sunohio to vent the hydrogen to the atmosphere rather than burning in the furnace.
- 2) Hydrogen must not flow through flexible hose region.
- 3) The furnace must be cleaned and piping pressure-tested prior to transfer of the PCBX rig to the site.

Comment: The volume of hydrogen generated is not currently known. Venting hydrogen to the atmosphere is generally bad practice in that a flammable gas is being released to the surroundings under little or no control. ~~It is recommended that the fire hazard be eliminated by the use of a flame arrestor to render the system safe.~~ Combustible gases from facilities such as oil refineries and sewage plants are handled in this manner.

B. Piping Modifications: Several segments of the process piping contain rubber hoses (2 - 3 feet lengths) which are not "flame tested" or not rated to withstand exposure to flame, should a fire occur. The Fire Marshall requires one of the following to be implemented:

- 1) Modify piping by addition of nitrogen purge to push process oil back to the holding tank to prevent oil from discharging from the rubber hose area during a fire.
- 2) Cover the rubber hose with refractory sleeves of ceramic material to insulate and to protect the rubber hose.
- 3) Replace rubber hose with a flexible metal hose or fire retardant high pressure hose, the type used in aircraft to withstand temperatures up to 2000°F.
- 4) Use fire resistant oil (silicone) instead of nitrogen for purging the lines.
- 5) Design a fire protection system to flood the whole trailer with nitrogen in case of fire.

Comments: The concept is good one. But Options 1) and 4) do not appear to be workable in terms of good engineering design, since it requires installation of diverter valves at each hose location. Option 2) will probably fail under prolonged exposure to flame. Option 5) is in itself a hazardous proposition - such a system would flood the process trailer with nitrogen reducing rapidly the oxygen available to personnel in the trailer. In addition, the explosive nature of the nitrogen releasing mechanism may cause injury to

personnel in the immediate vicinity of the flooding system. The only workable option, and a good one, is Option 3).

- C. Addition of two (2) sets of tanks: One set of tanks (feed storage - 5,000 gallons) must be placed at the front of the process, using existing process heating equipment, with a degasser installed prior to connection with the feed tanks. This will preclude water from inadvertently entering the PCBX process and generating uncontrolled quantities of hydrogen. Sunohio has elected to utilize one of the company's servicing trailers to accomplish this. The second set of tanks (product storage - 5,000 gallons) will enable Sunohio to check on reagent and hydrogen content as well as PCB concentration.

Comment: (1) ~~The installation of the second set of tanks~~  
~~is not necessary since the PCBX process is not a high pressure~~  
~~process and the Sunohio servicing trailer contains a degasser which is~~  
The Sunohio servicing trailer contains a degasser which is designed to operate under high vacuum and high temperature. Should droplets or slugs of water pass into the storage tanks and eventually into the process, no significant effects should occur. Since the chemical reagent is metered into the process stream at a controlled and relatively slow rate, the water entering the process may cause some process excursions. These excursions may affect PCB destruction, but will not pose a hazard to operators or the immediate surrounding. The process excursions will be twofold: (a) the hydrogen generated in the reaction will increase the volume of the reaction stream and decrease the residence time of the reactants in the reactor, resulting in reduced destruction of PCBs, (b) water will react with the reagent reducing the concentration of reagent available for PCB destruction. To ensure complete PCB destruction, Condition 3 of the Sunohio permit requires that any product at 2 ppm PCBs concentration or higher must be reprocessed. (2) The addition of the second set of tanks is necessary in terms of product storage. ~~The~~  
~~importance of checking on the reagent and hydrogen content~~  
~~of the product is not necessary since the PCBX~~  
~~process is not a high pressure process and the Sunohio~~  
~~servicing trailer contains a degasser which is~~

- D. Sight Glass Replacement: Existing sight glasses should be replaced.

- 1) There are 10-12 in-line sight glasses which will be replaced by high temperature, high pressure equipment, looks much like port-holes and can withstand fire temperatures.

- Comment: Conservative approach but reasonable.

- ## Sunohio Modifications

Comment: The by-passing of the [redacted] major  
[redacted] requiring a full scale demonstration.  
A red [redacted] process described around  
the [redacted] of [redacted]  
[redacted] appropriate. The demonstration or  
permit audit must confirm the PCBX capability to treat Bunker C  
oil to below 2 ppm PCBs and [redacted]  
laboratory capability to analyze for PCBs in Bunker C oil  
[redacted]. To ensure that any modification to the PCBX process is  
controlled by EPA, C [redacted] permit requires  
[redacted] approval. Although the modifications described  
herein require no formal demonstration for EPA approval,  
additional changes to the PCBX process may result in a  
requirement for a full scale demonstration for approval of the  
modifications.

cc: Chief Hanson, Fire Marshall  
Seattle, WA